

Appendix A

Proposed Regulation Order: Airborne Toxic Control Measure for Emissions of Hexavalent Chromium and Cadmium from Motor Vehicle and Mobile Equipment Coatings

PROPOSED REGULATION ORDER
AIRBORNE TOXIC CONTROL MEASURE
FOR EMISSIONS OF HEXAVALENT CHROMIUM AND CADMIUM
FROM MOTOR VEHICLE AND MOBILE EQUIPMENT COATINGS

Adopt new section 93112 title 17, California Code of Regulations (CCR), to read as follows:

Title 17 CCR, section 93112. Hexavalent Chromium and Cadmium Airborne Toxic Control Measure -- Motor Vehicle and Mobile Equipment Coatings.

- (a) **Effective Date.** No later than 120 days after the approval of this section by the Office of Administrative Law, each air pollution control and air quality management district must:
 - (1) Implement and enforce the requirements of this section, or
 - (2) Propose their own airborne toxic control measure for emissions of hexavalent chromium and cadmium from motor vehicle and mobile equipment coatings as provided in Health and Safety Code section 39666(d).
- (b) **Applicability**
 - (1) Except as provided in subdivision (c), this section applies to any person who sells, supplies, offers for sale, distributes, or manufactures coatings for use in motor vehicle and/or mobile equipment coating activities in California.
 - (2) This section also applies to the owner or operator of any motor vehicle and/or mobile equipment coating facility that uses motor vehicle and/or mobile equipment coatings in California.
 - (3) This section does not affect the sale, supply, or distribution of any new or used motor vehicles and/or mobile equipment or their component parts in or outside of California, regardless of the coatings that have been applied.
- (c) **Exemptions**
 - (1) This section shall not apply to any motor vehicle and/or mobile equipment coatings manufactured in California for shipment and use outside of California.
 - (2) This section shall not apply to a manufacturer or distributor who sells, supplies, or offers for sale in California a motor vehicle and/or mobile equipment coating that does not comply with the standards specified in subdivision (e), as long as the manufacturer or distributor can demonstrate both that the motor vehicle and/or mobile equipment coating is for shipment and use outside of California, and that the manufacturer or distributor has taken adequate precautions to assure that the motor vehicle and/or mobile equipment coating is not distributed to California. This subsection (2) does

not apply to motor vehicle and/or mobile equipment coatings that are sold, supplied, or offered for sale by any person to retail outlets in California.

- (d) **Definitions.** For the purposes of this section, the following definitions apply:
- (1) "Air Pollution Control Officer" means the Air Pollution Control Officer, or his or her delegate.
 - (2) "ASTM" means the American Society for Testing and Materials.
 - (3) "Cadmium" (Cd) means elemental cadmium and any compounds that contain cadmium.
 - (4) "Coating" means a material which is applied to a surface and which forms a film in order to beautify, preserve, repair, or protect such a surface.
 - (5) "Consumer" means any person who seeks, purchases, or acquires any motor vehicle and mobile equipment coating for use in motor vehicle and mobile equipment maintenance and repair activities. Persons acquiring a motor vehicle and mobile equipment coating for resale are not "consumers" of that coating.
 - (6) "Distributor" means any person to whom a motor vehicle and mobile equipment coating is sold or supplied for the purposes of resale or distribution in commerce, except that manufacturers, retailers, and consumers are not distributors.
 - (7) "Hexavalent Chromium" (Cr⁺⁶) means elemental chromium in the +6 oxidation state and any compounds which contain chromium in the +6 oxidation state.
 - (8) "Highway" has the same meaning as defined in section 360 of the Vehicle Code.
 - (9) "Manufacturer" means any person who imports, manufactures, assembles, produces, packages, repackages, or relabels a motor vehicle or mobile equipment coating.
 - (10) "Mobile Equipment" means any equipment that is designed to be physically capable of being driven or drawn upon rails or a roadway, except for motor vehicles, and components for and from such equipment. Examples of Mobile Equipment include mobile cranes; bulldozers; concrete mixers; tractors; plows; pesticide sprayers; street cleaners; golf carts; hauling equipment used inside and around an airport, dock, depot, and industrial and commercial plants; trains; railcars; truck trailers; implements of husbandry; aircraft ground support equipment; all terrain vehicles; self-propelled wheelchairs, invalid tricycles, and invalid quadricycles.

- (11) "Motor Vehicle " means passenger cars, truck cabs and chassis, vans, motorcycles, and buses.
- (12) "Motor Vehicle and/or Mobile Equipment Coating Activity" means any manufacturing, service, maintenance, repair, restoration, or modification involving the application of coatings to motor vehicles and/or mobile equipment, except plating activities.
- (13) "Motor Vehicle and/or Mobile Equipment Coating" means any coating used or advertised for use in motor vehicle and/or mobile equipment coating activities.
- (14) "Motor Vehicle and/or Mobile Equipment Coating Facility (Facility)" means any establishment at which coatings are applied to motor vehicles and/or mobile equipment, including, but not limited to, OEM facilities, autobody repair/paint shops, production autobody paint shops, new car dealer repair/paint shops, fleet operator repair/paint shops, custom-made car fabrication facilities, truck body-builders, and residences.
- (15) "OEM" means Original Equipment Manufacturer.
- (16) "Owner or Operator" means a person who is the owner or the operator of a motor vehicle and/or mobile equipment coating facility.
- (17) "Person" means "person" as defined in Health and Safety Code section 39047.
- (18) "Retailer" means any person who sells, supplies, or offers for sale motor vehicle and/or mobile equipment coatings directly to consumers.
- (19) "Retail Outlet" means any establishment at which motor vehicle and/or mobile equipment coatings are sold, supplied, or offered for sale directly to consumers.

(e) **Standards for Motor Vehicle and/or Mobile Equipment Coatings**

- (1) Except as provided in subdivision (f), no person shall sell, supply, offer for sale, or manufacture for sale in California any motor vehicle and/or mobile equipment coating that contains hexavalent chromium or cadmium.
- (2) No owner or operator of a motor vehicle and/or mobile equipment coating facility shall use or possess a motor vehicle and/or mobile equipment coating prohibited under subdivision (e)(1) after 12 months from the effective date of this regulation.
- (3) For the purposes of subdivision (e)(1), a coating "contains hexavalent chromium or cadmium" if hexavalent chromium or cadmium was introduced as a pigment or as an agent that imparts any property or characteristic to the coating during manufacturing, distribution, or use of the applicable coating.

- (f) **Sell-through of Coatings.** Notwithstanding the provisions of subdivisions (e)(1) and (e)(2), a motor vehicle and/or mobile equipment coating manufactured prior to the effective date of this regulation may be sold, supplied, or offered for sale for up to six months after the effective date of this regulation. This subdivision does not apply to any motor vehicle and/or mobile equipment coating which does not display on the coating container or package the date on which the coating was manufactured, or a code indicating such date.
- (g) **Administrative Requirements - Code-Dating**
- (1) Each manufacturer of a motor vehicle and/or mobile equipment coating subject to section 93112 shall clearly display on each coating container or package, the day, month, and year on which the coating was manufactured, or a code indicating such date. No person shall erase, alter, deface or otherwise remove or make illegible any date or code-date from any regulated coating container or package without the express authorization of the manufacturer.
- (2) If a manufacturer uses a code indicating the date of manufacture for any motor vehicle and/or mobile equipment coating subject to section 93112, an explanation of the code must be filed with the Air Pollution Control Officer no later than 30 days after the effective date of section 93112.
- (h) **Test Methods.** The following test methods are incorporated by reference herein, and shall be used to test coatings subject to the provisions of this rule.
- (1) American Society for Testing and Materials (ASTM) Method D3335-85a (1999), Standard Test Method for Low Concentrations of Lead, Cadmium, and Cobalt in paint by Atomic Absorption Spectroscopy.
- (2) United States Environmental Protection Agency test method 7196A, Chromium, Hexavalent (Calorimetric) and Test Method 3060A, Alkaline Digestion for Hexavalent Chromium.
- (3) Alternative methods which are shown to accurately determine the concentration of hexavalent chromium or cadmium compounds in a subject coating or its emissions may be used upon written approval of the Air Pollution Control Officer.

Authority cited: Sections 39600, 39601, 39650, 39655, 39656, 39658, 39659, 39665, and 39666, Health and Safety Code.

Reference: Sections 39002, 39600, 39650, 39655, 39656, 39658, 39659, 39665, 39666, and 40000, Health and Safety Code.

Appendix B

Survey of Motor Vehicle and Mobile Equipment Refinishing Coatings Containing Hexavalent Chromium or Cadmium (and their Alternatives), 2001



Winston H. Hickox
Agency Secretary

Air Resources Board

Alan C. Lloyd, Ph.D.
Chairman

1001 I Street • P.O. Box 2815 • Sacramento, California 95812 • www.arb.ca.gov



Gray Davis
Governor

February 23, 2001

Dear Sir or Madam:

The Air Resources Board (ARB/Board) staff is currently developing an Airborne Toxic Control Measure (ATCM) that would eliminate hexavalent chromium and cadmium from motor vehicle and mobile equipment refinishing coatings. As part of this effort, we are conducting a survey of coating manufacturers to determine the current use of these compounds in motor vehicle and mobile equipment coatings. The ARB last conducted a survey of motor vehicle and mobile equipment coatings in 1996. Since that time, significant changes in coating formulations have taken place. The current survey was developed with the assistance of local air districts and members of the National Paints and Coatings Association. The scope of the survey has been limited to coatings that contain hexavalent chromium and/or cadmium and their alternatives.

The request for information is made pursuant to sections 39600, 39607, 39701 and 41511 of the California Health and Safety Code, and title 17, California Code of Regulations, section 91100. These sections authorize the ARB to require the submission of information needed to estimate air emissions and to carry out its other statutory responsibilities. Any information that you designate as confidential will be protected in accordance with title 17, California Code of Regulations, sections 91000 to 91022 and the California Public Records Act (Government Code section 6250 et seq).

Your participation in the survey is crucial. The survey information will assist us in determining the technical feasibility and cost of eliminating the use of hexavalent chromium and cadmium compounds in auto refinishing coatings. Your response to the survey will enable us to reflect the changes in coating formulations in our emissions inventory and regulatory development efforts. Also, by responding to the survey, you ensure that your industry receives credit for emission reductions already achieved.

The enclosed survey package consists of the survey forms, survey instructions and filled-in sample forms, calculation procedures, and definitions. We have attempted to make the instructions for completing the survey as clear as possible, however, should

"The energy challenge facing California is real. Every Californian needs to take immediate action to reduce energy consumption. For a list of simple ways you can reduce demand and cut your energy costs, see our Web-site at www.arb.ca.gov."

California Environmental Protection Agency

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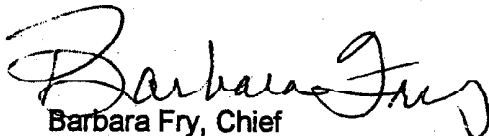
Dear Sir or Madam
February 23, 2001
Page 2

you have questions please contact us as noted below. We ask that you complete the survey in as much detail as possible for those products sold in California during the 2000 calendar year. The survey package is available on the Internet at: www.arb.ca.gov/coatings/autorefin/2000survey.htm. The survey can also be completed electronically. If you are interested in this option, please visit our web site for additional information. The completed survey is due to the ARB by April 23, 2001.

After the survey data are received and analyzed, we plan to hold public workshops to discuss the proposed ATCM. We plan to present the proposed ATCM to the Board for its consideration at a hearing in September 2001. We will notify you of public workshops as they are scheduled. We will notify you of public workshops and any discussion of our efforts to develop the ATCM.

We appreciate your promptness in completing the survey. Should you have any further questions concerning the survey do not hesitate to contact Mr. Jose Gomez, Manager, Technical Development Section at (916) 324-8033, or by e-mail at jgomez@arb.ca.gov, or Mr. Christopher Gallenstein, at (916) 324-8017, or by e-mail at cgallens@arb.ca.gov.

Sincerely,



Barbara Fry, Chief
Measures Assessment Branch
Stationary Source Division

Enclosures

cc: Mr. Jose Gomez, Manager
Technical Development Section

Mr. Christopher Gallenstein
Technical Development Section

Survey of
Motor Vehicle and Mobile Equipment Refinishing Coatings
Containing Hexavalent Chromium or Cadmium
(and their Alternatives)

2001

SURVEY FORMS

California Environmental Protection Agency

Air Resources Board

California Air Resources Board - Motor Vehicle and Mobile Equipment Refinishing Coatings Survey - 2001

CONFIDENTIAL INFORMATION SUBMITTAL FORM

If you wish to designate any information contained in your survey data as **CONFIDENTIAL INFORMATION**, please provide the data requested below and return it with your completed survey form.

In accordance with Title 17, California Code of Regulations (CCR), sections 91000 to 91022, and the California Public Records Act (Government Code Section 6250 et seq.), the information that a company provides to the Air Resources Board (ARB) may be released (1) to the public upon request, except trade secrets which are not emissions data or other information which is exempt from disclosure or the disclosure of which is prohibited by law; (2) to the Federal Environmental Protection Agency (EPA), which protects trade secrets as provided in Section 114 of the Clean Air Act and amendments thereto (42 USC 7401 et seq.) and in federal regulation; and, (3) to other public agencies provided that those agencies preserve the protections afforded information which is identified as a trade secret, or otherwise exempt from disclosure by law (Section 39660(e)).

Trade secrets as defined in Government Code Section 6254.7 are not public records and therefore will not be released to the public. However, the California Public Records Act provides that air pollution emission data are always public records, even if the data comes within the definition of trade secrets. On the other hand, the information used to calculate air pollution emissions may be withheld from the public if the information is a trade secret.

If any company believes that any of the information it may provide is a trade secret or otherwise exempt from disclosure under any other provision of law, **it must identify the confidential information as such at the time of submission to the ARB and must provide the name, address, and telephone number of the individual to be consulted.** If the ARB receives a request for disclosure or seeks to disclose the data claimed to be confidential, the ARB may ask the company to provide documentation of its claim of trade secret or exemption at a later date. Data identified as confidential will not be disclosed unless the ARB determines, in accordance with the above referenced regulations, that the data do not qualify for a legal exemption from disclosure. The regulations establish substantial safeguards before any such disclosure.

In accordance with the provisions of Title 17, California Code of Regulations, sections 91000 to 91022, and the California Public Records Act (Government Code Sections 6250 et seq.),

Company Name: _____ declares that only those portions specifically identified and submitted in response to the California Air Resources Board's information request on the survey are confidential "**trade secret**" information, and requests that it be protected as such from public disclosure. All inquiries pertaining to the confidentiality of this information should be directed to the following person:

Name (print only): _____

Signature: _____

Title: _____

Telephone #: _____

Company Address: _____

General Information Form

1a. Do you currently manufacture motor vehicle and/or mobile equipment coatings that contain cadmium or hexavalent chromium for sale in California?

Yes No

1b. If No, have you at any time in the past manufactured motor vehicle and/or mobile equipment coatings that contain cadmium or hexavalent chromium for sale in California?

Yes No

If Yes to Question 1a, please complete Form I and Forms II and IV for each coating product that contains hexavalent chromium or cadmium. (See Form Instructions for each specific form).

2. Do you manufacture motor vehicle and/or mobile equipment coating products that are alternatives to coatings for sale in California that contain hexavalent chromium or cadmium (hexavalent chromium/cadmium-free coatings)? Yes No

If Yes, please complete Forms III and V (See Form Instructions for each specific form).

If you have answered No to both Question No.1a and Question No.2, please attach this form to Form I and complete, sign and date Form I and return these forms as directed in the Instructions For Returning Forms found on page 1 of the Survey Form Instructions.

FORM I

Company Information

Company / Division Name:	
Address:	
Contact Person:	Title:
Telephone:	Fax: /e-mail:
RESPONSIBLE PARTY (check appropriate box) YES NO	If you answered "NO" to Responsible Party please complete the certification section below and submit this form and the general information form to CARB.

TYPE OF BUSINESS (check all that apply)

- ☐ Manufacturer
☐ Importer
☐ Retailer
☐ Private label contract packager
☐ Custom contract packager

COMPANY MARKETING CLASSIFICATION

- ☐ International
☐ National
☐ California Statewide
☐ California Regional - If so, which parts:

INDEPENDENT OWNERSHIP

Is your company independently owned?

YES NO

If No, please provide parent company information below.

Parent Company Name:

--

Parent Company Address:

SIC CODES (Enter primary SIC codes)

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COMPANY - GROSS ANNUAL RECEIPTS

- ☐ Less than \$500,000
☐ \$500,000 up to \$1 million
☐ \$1 million up to \$2 million
☐ \$2 million up to \$5 million
☐ \$5 million up to \$10 million
☐ \$10 million up to \$100 million
☐ \$100 million up to \$1 billion
☐ \$1 billion or more

CALIFORNIA - GROSS ANNUAL RECEIPTS

- ☐ Less than \$500,000
☐ \$500,000 up to \$1 million
☐ \$1 million up to \$2 million
☐ \$2 million up to \$5 million
☐ \$5 million up to \$10 million
☐ \$10 million up to \$100 million
☐ \$100 million up to \$1 billion
☐ \$1 billion or more

EMPLOYEES

- ☐ 10 or less
☐ 11 to 100
☐ 101 to 250
☐ 251 to 500
☐ 501 or more

CALIFORNIA EMPLOYEES

- ☐ 10 or less
☐ 11 to 100
☐ 101 to 250
☐ 251 to 500
☐ 501 or more

CERTIFICATION

I hereby certify that, to the best of my knowledge and belief, all information entered on the General Information, Company Information, Product Information and Ingredient Information Forms are complete and accurate.

Name:	Title:
Signature:	Date Signed:

FOR ARB USE ONLY

Company Code:

Total # of Pages Submitted:

Survey of
Motor Vehicle and Mobile Equipment Refinishing Coatings
Containing Hexavalent Chromium or Cadmium
(and their Alternatives)

2001

SURVEY FORM INSTRUCTIONS

California Environmental Protection Agency

Air Resources Board

SURVEY INSTRUCTION CONTENTS

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QUESTIONS

If you have any questions or other requests please call:

Jose Gomez
tel 916.324.8033
jgomez@arb.ca.gov

or write

California Air Resources Board
P.O. Box 2815
Sacramento, CA 95812
ATTN: SSD/Measures Assessment Branch
Motor Vehicle Coatings Survey
tel 916.324.8022
Fax 916.324.8026

Christopher Gallenstein
tel 916.324.8017
cgallens@arb.ca.gov

INSTRUCTIONS FOR RETURNING FORMS

Forms should be completed as instructed in each individual form. Please make sure that the General Information Form, a signed and dated Form I, and all applicable forms are completed and returned. Please return all completed forms to:

California Air Resources Board
P.O. Box 2815
Sacramento, CA 95812
ATTN: SSD/Measures Assessment Branch
Motor Vehicle Coatings Survey

ELECTRONIC SUBMITTAL OPTIONS

The survey forms are also available in a Microsoft Access database format. If you prefer to complete and/or return the forms electronically, details can be obtained by contacting either Jose Gomez at (916) 324-8033 or Christopher Gallenstein at (916) 324-8017.

Additional survey packages can also be downloaded from:
www.arb.ca.gov/coatings/autorefin/2000survey.htm

INTRODUCTION

Thank you for participating in this survey of motor vehicle and mobile equipment coatings!

The survey asks you to complete six forms:

1. General Information Form
2. FORM I: Company Information
3. FORM II: Product Information for Coatings Containing Hexavalent Chromium and/or Cadmium
4. FORM III: Product Information for Alternatives to Coatings Containing Hexavalent Chromium and/or Cadmium
5. FORM IV: Ingredient Information for Coatings Containing Hexavalent Chromium and/or Cadmium
6. FORM V: Ingredient Information for Alternatives to Coatings Containing Hexavalent Chromium and/or Cadmium

How will this survey information be used? Our existing inventory of toxic air emissions from motor vehicle and mobile equipment coatings is based on limited data supplied to ARB through the AB2588 "Hot Spots" program and other limited data that were collected between 1988 and 1996. Inventory information is necessary for planning and modeling to forecast the effects of new regulatory efforts. Accurate inventory information produces better results, and also assures that businesses are properly credited for successful reductions in emissions. Finally, the ingredient information requested will be used to study the ingredients of the coatings that contain hexavalent chromium and/or cadmium and the coating ingredients of the coatings that are replacing hexavalent chromium and/or cadmium.

We have tried to make this survey as simple as possible. We worked with several air pollution control districts as well as the National Paint and Coatings Association on the content of the survey. However, you may have questions as you complete the survey. Do not hesitate to call us and we will answer your questions as quickly as possible.

If you wish to designate any information contained in your survey data as CONFIDENTIAL INFORMATION, please read and complete the confidential information submittal form included in the survey forms package.

Thank you again, in advance, for your time and participation in this survey.

INSTRUCTIONS FOR COMPLETING THE GENERAL INFORMATION FORM AND SURVEY FORM I

Please complete the General Information Form (self-explanatory) and include this form with all survey responses.

The following instructions apply to FORM I - Company Information. General company information such as name and address are needed, as well as information regarding the company size and business type. This information will assist in characterizing the types of businesses that are included in the survey as required by state law.

Company Name: Please enter the name of the company also known as **responsible party**.

Division Name: If the respondent to the survey is representing a division of the company, please enter the name of the division.

Address: Enter the mail address of the company or division responsible for completing the survey.

Contact Name: Name of the person to be contacted if there are questions about the survey responses.

Title: Business title of the contact person.

Telephone: Telephone number for the contact person.

Fax: Fax number of the contact person.

E-mail: E-mail address of the contact person.

Responsible Party: Check the appropriate box (Yes or No) to indicate if your company is the responsible party (see definition below) for any motor vehicle and mobile equipment coatings that were sold in California.

"Responsible party" means the company, firm or establishment which is listed on the products' label. If the label lists two companies, firms or establishments, the responsible party is the party which the product was "manufactured for" or "distributed by," as noted on the label.

Note: If you are not the responsible party, please stop here and complete the "Certification" section of Form I. Return Form I and the General Information Form to the California Air Resources Board, P.O. Box 2815, Sacramento, CA 95812 ATTN: SSD/Measures Assessment Branch Motor Vehicle Coatings Survey.

Type of Business: Check the box(s) that describes the primary type of business conducted by your company or division.

Company Marketing Classification: Check the box that describes your company's primary marketing classification.

Independent Ownership: Check the appropriate answer box (Yes or No) to indicate if the company is independently owned. If the company is not independently owned, enter the name and address of the parent company in the spaces provided.

Standard Industrial Classification (SIC) codes: Enter your company's primary SIC codes (see page 18).

Gross Annual Receipts: Check the box which identifies the gross annual receipts generated by the company or division.

California - Gross Annual Receipts: Check the box which identifies the gross annual receipts generated by the company or division in California.

Employees: Check the box which identifies the number of employees (including part-time and temporary staff) of the company or division.

California Employees: Check the box which identifies the number of employees (including part-time and temporary staff) of the company or division in California.

Certification: Please have a designated contact person certify the accuracy of the completed General Information Form, Company Information (FORM I), Product Information (FORM II & III), and the Ingredient Information (FORM IV and FORM V).

INSTRUCTIONS FOR COMPLETING SURVEY FORM II

This form requests specific information on each product or grouping of products. As explained below, products may be grouped under certain conditions. Only complete FORM II Product Information if you are the **responsible party** for a product sold in California during the calendar year 2000.

Entry #: Enter a number (1, 2, ...) for each entry on FORM II. This number will be used to relate products listed in this table to the ingredient information table in Form IV and to alternative products on Form III.

Product Name: Enter the product name and product number as printed on the label. Example: XYZ 23-66 Chromated Etch Primer

Coating Code: Enter the code from the list below which best represents the reported coatings' category

Code	Coating
1	Metal Etch Primer
2	Epoxy Primer
3	Primer Sealer
4	Sealer
5	tint/toner
6	Package Color
7	Other (Specify)

Percent Hexavalent Chromium (wt. %): Enter the weight percent of hexavalent chromium in the coating. Do not include the weight of the container. Weight shall be expressed to 0.01 percent or less if known (Example 0.23% or 0.234%).

Percent Cadmium (wt. %): Enter the weight percent of cadmium in the coating. Do not include the weight of the container. Weight shall be expressed to 0.01 percent or less if known (Example 1.23% or 1.234%).

VOC Regulatory: Enter the VOC content of the coatings(s), as supplied, in grams of VOC per liter of coating, less water and less exempt compounds. This may be determined from the chemical composition data or previously determined by EPA Method 24, 40 CFR Part 60, as amended in Federal Register Vol. 57, No. 133, July 10, 1992, or ASTM D 3960-92. (See calculations on page 16) Do not perform additional analysis for purposes of completing this survey.

Coating Density: Enter the mass per unit volume of the coating (lbs/gallon).

2000 California Sales in Gallons: Enter the California sales of the coating, in gallons, for the calendar year 2000. If California specific sales data are not available, sales may be estimated using national or regional sales figures that are apportioned appropriately. If you use population as a basis for determining sales, please use the U.S. Resident Population estimates provided on page 17 of these survey instructions.

Percent of Total California Sales in Gallons of Product Type: Enter the percent of California sales of the coating category that the product represents. Example: XYZ 23-66 Chromated Etch Primer represents 60 percent of the total quantity of etch primers sold by your company in California for calendar year 2000.

Price per Gallon: Enter the wholesale price per gallon. If price varies, enter the average wholesale price per gallon.

Recommended Thinning: If the manufacturer recommends adding catalyst, activators, reducers, etc., please indicate the appropriate mix ratios of the additional materials.

Comments: If you have any comments, including VOC, hiding ability, or corrosion resistance of the coating, that will help clarify entries made for FORM II, enter these comments in this section or attach additional comments and state that additional comments are attached. Note: please supply data to substantiate any claims made in the comment section.

INSTRUCTIONS FOR COMPLETING SURVEY FORM III
Product Information for Alternatives to Coatings Containing Hexavalent Chromium
and/or Cadmium

FORM III requests information about coating alternatives to a hexavalent chromium and/or cadmium-containing coatings listed on Form II.

Entry #: Enter a number (1, 2, ...) for each entry on FORM III. This number will be used to relate products listed in this table to the ingredient information table in Form V.

Alternative to Form II Entry #: Enter the corresponding entry # from Form II.

Product Name: Enter the product name as printed on the label and include product number.
Example: XYZ 22-65 Non-Chromated Etch Primer

Coating Code: Enter the code from the list below which best represents the reported coatings' category

<u>Code</u>	<u>Coating</u>
1	Metal Etch Primer
2	Epoxy Primer
3	Primer Sealer
4	Sealer
5	tint/toner
6	Package Color
7	Other (Specify)

VOC Regulatory: Enter the VOC content of the coatings(s), as supplied, in grams of VOC per liter of coating, less water, and less exempt compounds. This may be determined from the chemical composition data or previously determined by EPA Method 24, 40 CFR Part 60, as amended in Federal Register Vol. 57, No. 133, July 10, 1992, or ASTM D 3960-92. (See calculations on page 16) Do not perform additional analysis for purposes of completing this survey.

Coating Density: Enter the mass per unit volume of the coating (lbs/gallon).

2000 California Sales in Gallons: Enter the California sales of the coating, in gallons, for the calendar year 2000. If California specific sales data are not available, sales may be estimated using national or regional sales figures that are apportioned appropriately. If you use population as a basis for determining sales, please use the U.S. Resident Population estimates provided on page 17 of this survey.

Percent of Total California Sales in Gallons of Product Type: Enter the percent of California sales of the coating category, that the product represents. Example XYZ 23-65 Non-Chromated Etch Primer represents 40 percent of the total quantity of etch primers sold by XYZ company in California.

Price per Gallon: Enter the wholesale price per gallon. If price varies, enter the average wholesale price per gallon.

Recommended Thinning: If the manufacturer recommends adding catalyst, activators, reducers, etc., please indicate the appropriate mix ratios and diluent type of the additional materials.

Comments: If you have any comments, including the VOC, hiding ability or corrosion resistance of the coating that will help clarify entries made for FORM III, enter these comments in this section or attach additional comments and state that additional comments are attached. Note: please supply data to substantiate any claims made in the comment section.

INSTRUCTIONS FOR COMPLETING SURVEY FORM IV
Ingredient Information Table

FORM IV requests ingredient information about products that were included in Form II. Identify the percent of hexavalent chromium and/or cadmium to 0.01% or less if known. Any VOCs less than 1.0 percent by weight should be aggregated and entered as a single weight percent value. Any Exempt Compounds less than 1.0 percent by weight should be aggregated and entered as a single weight percent value. Any remaining ingredients should be included in "All Other" for a total of all ingredients equaling 100 percent by weight of the product.

Entry # From FORM II: Enter the Entry # from FORM II to which this ingredient list applies.

Ingredient #: Provide a numeric value (sequential) for each ingredient.

Ingredient Name: Enter the chemical name of the ingredient. Chemical names must be distinguished from trade names. For example, the chemical name of SD 40 Alcohol is ethanol. Enter the trade name of the ingredient if the chemical name is unknown.

CAS#: Please enter the Chemical Abstract Service (CAS) number for the ingredient.

Weight % (of total material): Enter the percent by weight of each ingredient in the final product. If the ingredient is a mixture of known components, list the components separately with their individual weight percentages in the final product. If the components of a mixture cannot be determined, list the ingredient as a single entity.

Reporting Level - List ingredients that contain hexavalent chromium or cadmium that individually amount to 0.01% or greater by weight of the final product. List all other ingredients that individually amount to 1.0% or greater by weight of the final product.

VOCs: Enter the name, CAS #, and percent by weight of each VOC in the final product.

Exempt Compounds (Exempt VOCs): Enter the name, CAS #, and percent by weight of each Exempt VOC in the final product. See pages 13 and 14 for a list of exempt compounds.

Aggregated VOCs < 1.0%: Aggregate each of the remaining VOCs that individually account for less than 1.0% of the final product and enter the weight percent.

Aggregated Exempt Compounds < 1.0%: Aggregate each of the remaining Exempt Compounds that individually account for < 1.0% of the final product and enter the weight percent.

ALL Other (Remaining Ingredients): Enter remaining ingredients.

Total of All Ingredients: The sum of all ingredients in the table must equal 100 percent by weight. If this value does not sum to 100, please check the component percentages. For example:

<u>Ingredient Groups</u>	<u>Wt%</u>
Sum of Hexavalent Chromium	2.582
Sum of Cadmium	3.718
Sum of VOCs	63.4
Sum of Exempt Compounds	8.2
Aggregated VOCs < 1.0%	2.1
Aggregated Exempt Compounds < 1.0%	1.5
Water	2.1
All Other	16.4
Total of All Ingredients	100%

Comments: Enter any information that will help clarify entries made for FORM IV.

INSTRUCTIONS FOR COMPLETING SURVEY FORM V
Ingredient Information Table

FORM V requests ingredient information about products that were included in Form III. Identify the percent of alternative ingredient to hexavalent chromium and/or cadmium to 0.1% or less if known. Any VOCs less than 1.0 percent by weight should be aggregated and entered as a single weight percent value. Any Exempt Compounds less than 1.0 percent by weight should be aggregated and entered as a single weight percent value. Identify the alternatives and include them to the tenth of a percent (0.1%). Any remaining ingredients should be included in "All Other" for a total of all ingredients equaling 100 percent by weight of the product.

Entry # From FORM III: Enter the Entry # from FORM III to which this ingredient list applies.

Ingredient #: Provide a numeric value (sequential) for each ingredient.

Ingredient Name: Enter the chemical name of the ingredient. Chemical names must be distinguished from trade names. For example, the chemical name of SD 40 Alcohol is ethanol. Enter the trade name of the ingredient if the chemical name is unknown.

CAS#: Please enter the Chemical Abstract Service (CAS) number for the ingredient.

Weight % (of total material): Enter the percent by weight of each ingredient in the final product. If the ingredient is a mixture of known components, list the components separately with their individual weight percentages in the final product. If the components of a mixture cannot be determined, list the ingredient as a single entity.

Reporting Level - List ingredients that are alternatives to hexavalent chromium or cadmium that individually amount to 0.1% or greater by weight of the final product. List all other ingredients that individually amount to 1.0% or greater by weight of the final product.

VOCs: Enter the name, CAS #, and percent by weight of each VOC in the final product.

Exempt Compounds (Exempt VOCs): Enter the name, CAS #, and percent by weight of each Exempt VOC in the final product. See pages 13 and 14 for a list of exempt compounds.

Aggregated VOCs < 1.0%: Aggregate each of the remaining VOCs that individually account for less than 1.0% of the final product and enter the weight percent.

Aggregated Exempt Compounds < 1.0%: Aggregate each of the remaining Exempt Compounds that individually account for < 1.0% of the final product and enter the weight percent.

ALL Other (Remaining Ingredients): Enter remaining non-volatile ingredients.

Total of All Ingredients: The sum of all ingredients in the table must equal 100 percent by weight. If this value does not sum to 100, please check the component percentages. For example:

California Air Resources Board-Motor Vehicle and Mobile Equipment Refinishing Coatings Survey-2001

<u>Ingredient Groups</u>	<u>Wt%</u>
Sum of Alternatives to Hexavalent Chromium	6.3
Sum of VOCs	63.4
Sum of Exempt Compounds	8.2
Aggregated VOCs < 1.0%	2.1
Aggregated Exempt Compounds < 1.0%	1.5
Water	2.1
All Other	16.4
Total of All Ingredients	<u>100%</u>

Comments: Enter any information that will help clarify entries made for FORM V.

DEFINITIONS

Alternative Ingredients: Ingredients that are substituting for either hexavalent chromium or cadmium containing ingredients.

Catalyst: A substance that enables a chemical reaction to proceed at a faster rate or under different conditions than otherwise possible.

Coating: A liquid, liquefiable or mastic composition which is converted to a solid protective, decorative or functional adherent film after application as a thin layer.

Density: Mass per unit volume.

Exempt Compounds: means any of the following organic compounds (compounds with negligible photochemical reactivity):

methane;	[74-82-8]*
methylene chloride (dichloromethane);	[75-09-2]
1,1,1-trichloroethane (methyl chloroform);	[71-55-6]
trichlorofluoromethane (CFC-11);	[75-69-4]
dichlorodifluoromethane (CFC-12);	[75-43-4]
1,1,2-trichloro-1,2,2-trifluoroethane (CFC-113);	[76-13-1]
1,2-dichloro-1,1,2,2-tetrafluoroethane (CFC-114);	[76-14-2]
chloropentafluoroethane (CFC-115);	[76-15-3]
chlorodifluoromethane (HCFC-22);	[75-45-6]
1,1,1-trifluoro-2,2-dichloroethane (HCFC-123);	[306-83-2]
2-chloro-1,1,1,2-tetrafluoroethane (HCFC-124);	[2837-89-0]
1,1-dichloro-1-fluoroethane (HCFC-141b);	[1717-00-6]
1-chloro-1,1-difluoroethane (HCFC-142b);	[75-68-3]
trifluoromethane (HFC-23);	[75-46-7]
pentafluoroethane (HFC-125);	[354-33-6]
1,1,2,2-tetrafluoroethane (HFC-134);	[359-35-3]
1,1,1,2-tetrafluoroethane (HFC-134a);	[811-97-2]
1,1,1-trifluoroethane (HFC-143a);	[420-46-2]
1,1-difluoroethane (HFC-152a);	[75-37-6]
cyclic, branched, or linear completely methylated siloxanes;	[various]
the following classes of perfluorocarbons:	[various]
(A) cyclic, branched, or linear, completely fluorinated alkanes;	
(B) cyclic, branched, or linear, completely fluorinated ethers with no unsaturations;	
(C) cyclic, branched, or linear, completely fluorinated tertiary amines with no unsaturations;	
and	
(D) sulfur-containing perfluorocarbons with no unsaturations and with the sulfur bonds only to carbon and fluorine; and the following low-reactive organic compounds which have been exempted by the U.S. EPA:	
acetone;	[67-64-1]
ethane;	[74-84-0]
methyl acetate	[79-20-9]
[perchloroethylene]*; and	[127-18-4]
parachlorobenzotrifluoride (1-chloro-4-trifluoromethyl benzene).	[98-56-6]

* NOTE: Chemical Abstract Service (CAS) identification numbers have been included in brackets []

for convenience.

****** *The Air Resources Board exempted Perchloroethylene from the definition of VOC in the Consumer Products regulations in November 1996. Perchloroethylene is under evaluation for other inventory categories.*

Highway: A way or place of whatever nature, publicly maintained and open to the use of the public for purposes of vehicular travel. Highway includes street.

Importer: A company, group, or individual that brings motor vehicle or mobile equipment coatings from a location outside the United States into the United States for sale or distribution within the United States.

Label: Any written, printed, or graphic matter affixed to, applied to, attached to, blown into, formed, molded into, embossed on, or appearing upon any motor vehicle or mobile equipment coating container for purposes of branding, identifying, or giving information with respect to the product, use of the product, or contents of the container.

Manufacturer: A company, group, or individual that produces, packages, or repackages motor vehicle and/or mobile equipment coatings for sale or distribution in the United States.

Metallic/Iridescent Topcoats: Any topcoat which contains more than 0.042 pounds of iridescent particles, composed of metal as metallic particles or silicon as mica particles, as applied, where such particles are visible in the dried film.

Mobile Equipment: Any equipment, other than vehicles (as defined below), which may be drawn or is capable of being drawn on a roadway, including, but not limited to truck trailers, camper shells, mobile cranes, bulldozers, concrete mixers, street cleaners, golf carts, all terrain vehicles, implements of husbandry, and hauling equipment used inside and around airports, docks, depots and industrial and commercial plants.

Multi-Color Coating: Coatings which exhibit more than one color when applied and which are packaged in a single container and applied in a single coat.

Pre-treatment Wash Primers: Coatings which contain a minimum of 0.5% acid by weight, applied directly to bare metal surfaces to provide necessary surface etching.

Primers: Any coating applied prior to the application of a topcoat for the purpose of corrosion resistance and adhesion of the topcoat.

Primer Sealer: Any coating applied for the purpose of sealing the underlying metal or coating system prior to the application of a topcoat.

Primer Surfacer: Any coating applied prior to the application of a topcoat for the purpose of corrosion resistance, adhesion of the topcoat and which promotes a uniform surface by filling in surface imperfections.

Reducer: the solvent used to thin enamel.

Refinishing: Any coating of vehicles, their parts or components, or mobile equipment, including partial body collision repair, for the purpose of protection or beautification and which is

subsequent to the original coating applied at the Original Equipment Manufacturing (OEM) plant coating assembly line.

Responsible Party: The company, firm or establishment which is listed on the product's label. If the label lists two companies, firms or establishments, the responsible party is the party which the product was "manufactured for" or "distributed by," as noted on the label.

SIC (Standard Industrial Classification) Code: A United States Department of Commerce system that organizes all industry types in the United States. Each business establishment is classified according to its primary activity, signified by a four digit SIC code (See page 18).

Topcoat: Any coating applied over a primer, primer system, or an original OEM finish for the purpose of protection or appearance.

Vehicle: A device by which any person or property may be propelled, moved, or drawn upon a Highway, excepting a device moved exclusively by human power or used exclusively upon stationary rails or tracks.

Volatile Organic Compound (VOC): Any compound of carbon, excluding carbonates (carbon monoxide, carbon dioxide, carbonic acid, metallic carbides or carbonates, ammonium carbonate), and exempt compounds.

VOC Regulatory: The VOC content of the coatings(s), as supplied, in grams of VOC per liter of coating, less water, and less exempt compounds. This may be determined from the chemical composition data or previously determined by EPA Method 24, 40 CFR Part 60, as amended in Federal Register Vol. 57, No. 133, July 10, 1992, or ASTM D 3960-92. See calculations on page 16.

CALCULATIONS

VOC Content Calculations

The following equations can be used to calculate entries contained in Forms II and III of this survey.

$$\text{VOC}_{\text{Regulatory}} = \frac{W_{\text{vm}} - W_{\text{w}} - W_{\text{e}}}{V_{\text{c}} - V_{\text{w}} - V_{\text{e}}}$$

Where:

W_{vm}	=	Total weight of volatile materials (VOC+water+exempt compounds) in the coating, in grams
W_{w}	=	Weight of water in the coating, in grams
W_{e}	=	Weight of exempt compounds in the coating, in grams
V_{c}	=	Total volume of the coating, in liters
V_{w}	=	Volume of water in the coating, in liters
V_{e}	=	Volume of exempt compounds in the coating, in liters

Conversion Factors

VOC Regulatory (weight per volume):

one pound VOC per gallon (US) = 119.82 grams VOC per liter

Units of Volume:

1 fl oz = 0.029574 liters

1 liquid pint = 0.47318 liters

1 liquid quart = 2 liquid pints = 0.94635 liters

1 gallon = 4 liquid quarts = 3.7854 liters

Units of Mass:

Unit	ounce(oz)	pound(lb)	gram(g)	kilogram(kg)
1 oz =	1	0.0625	28.3495	0.02834
1 lb =	16	1	453.592	0.45359

UNITED STATES RESIDENT POPULATION*
April 1, 2000

Area	Population as of	State Rank as of	Area	Population as of	State Rank as of
	April 1, 2000	April 1, 2000		April 1, 2000	April 1, 2000
Alabama	4,447,100	23	Nebraska	1,711,263	38
Alaska	626,932	48	Nevada	1,998,257	35
Arizona	5,130,632	20	New Hampshire	1,235,786	41
Arkansas	2,673,400	33	New Jersey	8,414,350	9
California	33,871,648	1	New Mexico	1,819,046	36
Colorado	4,301,261	24	New York	18,976,457	3
Connecticut	3,405,565	29	North Carolina	8,049,313	11
Delaware	783,600	45	North Dakota	642,200	47
District of Columbia	572,059	(NA)	Ohio	11,353,140	7
Florida	15,982,378	4	Oklahoma	3,450,654	27
Georgia	8,186,453	10	Oregon	3,421,399	28
Hawaii	1,211,537	42	Pennsylvania	12,281,054	6
Idaho	1,293,953	39	Rhode Island	1,048,319	43
Illinois	12,419,293	5	South Carolina	4,012,012	26
Indiana	6,080,485	14	South Dakota	754,844	46
Iowa	2,926,324	30	Tennessee	5,689,283	16
Kansas	2,688,418	32	Texas	20,851,820	2
Kentucky	4,041,769	25	Utah	2,233,169	34
Louisiana	4,468,976	22	Vermont	608,827	49
Maine	1,274,923	40	Virginia	7,078,515	12
Maryland	5,296,486	19	Washington	5,894,121	15
Massachusetts	6,349,097	13	West Virginia	1,808,344	37
Michigan	9,938,444	8	Wisconsin	5,363,675	18
Minnesota	4,919,479	21	Wyoming	493,782	50
Mississippi	2,844,658	31			
Missouri	5,595,211	17			
Montana	902,195	44			
			TOTAL RESIDENT POPULATION	281,421,906	(NA)

* From U.S. Census Bureau, 2000 Census (<http://www.census.gov/population/cen2000/tab04.pdf>)

SIC CODES

The SIC codes below represent only portions of Manufacturing, Wholesale Trade and Retail Trade*. The list is by no means all inclusive, but represents a useful reference if your company SIC code is not known. A full listing is available from the ARB upon request. Complete listings and detailed descriptions are also available via the internet at <http://www.census.gov/epcd/naics/NSIC3B.HTM#S28>

CHEMICALS AND ALLIED PRODUCTS

2810 -- Industrial Inorganic Chemicals
2812 -- Alkalies and chlorine
2813 -- Industrial gases
2816 -- Inorganic pigments
2819 -- Industrial inorganic chemicals, not elsewhere classified
2820 -- Plastics Materials and Synthetic Resins, Synthetic Rubber, Cellulosic, etc.
2821 -- Plastics materials and resins
2822 -- Synthetic rubber
2823 -- Cellulosic manmade fibers
2824 -- Organic fibers, noncellulosic
2843 -- Surface active agents
2850 -- Paints, Varnishes, Lacquers, Enamels, and Allied Products
2851 -- Paints and allied products
2860 -- Industrial Organic Chemicals
2861 -- Gum and wood chemicals
2865 -- Cyclic crudes and intermediates
2869 -- Industrial organic chemicals, not elsewhere classified
2890 -- Miscellaneous Chemical Products
2891 -- Adhesives and sealants
2895 -- Carbon black
2899 -- Chemical preparations, not elsewhere classified

WHOLESALE TRADE

5085 -- Industrial Supplies
5160 -- Chemicals and Allied Products
5169 -- Chemicals & allied products, not elsewhere classified
5198 -- Paint products wholesale

RETAIL

5211 -- Lumber & bldg mtl's retail
5231 -- Paint, glass, and wallpaper stores
5251 -- Hardware stores

*From U.S. Census Bureau

FORM I**Company Information**

Company / Division Name: XYZ Company	
Address: 1111 South Windham Road, Lansing, MI, 22222	
Contact Person: John Doe	Title: Manager, Product Compliance
Telephone: (999) 999-9999	Fax: (999) 999-9998 /e-mail: jdoe@XYZ.com
RESPONSIBLE PARTY (✓ check appropriate box) <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	
If you answered "NO" to Responsible Party please stop here and submit FORM I to CARB.	

TYPE OF BUSINESS (✓ check all that apply)

- ☒ Manufacturer
☐ Importer
☐ Retailer
☐ Private label contract packager
☐ Custom contract packager

COMPANY MARKETING CLASSIFICATION

- ☐ International
☒ National
☐ California Statewide
☐ California Regional (which)

SIC CODES (Enter primary SIC codes)

8215		
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COMPANY - GROSS ANNUAL RECEIPTS

- ☐ Less than \$500,000
☐ \$500,000 up to \$1 million
☐ \$1 million up to \$2 million
☐ \$2 million up to \$5 million
☐ \$5 million up to \$10 million
☐ \$10 million up to \$100 million
☐ \$100 million up to \$1 billion
☐ \$1 billion or more

STATE - GROSS ANNUAL RECEIPTS

- ☐ Less than \$500,000
☐ \$500,000 up to \$1 million
☐ \$1 million up to \$2 million
☐ \$2 million up to \$5 million
☐ \$5 million up to \$10 million
☐ \$10 million up to \$100 million
☐ \$100 million up to \$1 billion
☐ \$1 billion or more

Is your company independently owned?

- ☒ YES ☐ NO

If No, please provide parent company information below.

Parent Company Name:

--

Parent Company Address:

CALIFORNIA EMPLOYEES

- ☐ 10 or less
☒ 11 to 100
☐ 101 to 250
☐ 251 to 500
☐ 501 or more

CERTIFICATION

I hereby certify that, to the best of my knowledge and belief, all information entered on the General Information, Company Information, Product Information and Ingredient Information Forms are complete and accurate.

Name: John Doe	Title: Manager, Product Compliance
Signature: X	Date Signed: April 30, 2001
FOR ARB USE ONLY	Company Code: _____ Total # of Pages Submitted: _____

Product Information

[illegible]

COMMENTS

Enter current page # out of the total pages submitted for FORM II. Photocopy this page as necessary.

Product Information for ALTERNATIVES to Coatings Containing Hexavalent Chromium and/or Cadmium

[illegible]

COMMENTS

Page _____ **of** _____
Enter current page # out of the total pages submitted for FOIA request.
FOIA b7(D) - This information may be withheld from release under the Freedom of Information Act.

FORM IV

Ingredient Information Table - Complete for each entry # in Form II

list all ingredients (at least 10% of formulation by weight) of Chromium and Calcium at least 0.01% (or less if know)

[illegible]

* Wt. % is the weight % of the ingredient in the total weight of the product. List ingredients that are 1.0% or greater by weight of the product. Hexavalent Chromium and Cadmium at 0.01% (or less).

If the ingredient list for one entry from FORM II spans multiple pages enter current page # of the total. Photocopy this page as necessary.

Alternative Ingredient Information Table - Complete for each entry # in Form III

[illegible]

* Wt. % is the weight % of the ingredient in the total weight of the product. List Alternatives (if known) List other ingredients that amount to 1.0% or greater by weight of the product (or less if known) List other ingredients that amount to 1.0% or greater by weight of the product. Photocopy this page as necessary.

Appendix C

Air Dispersion Modeling of Hexavalent Chromium Emissions from Automotive Body Repair Facilities

Appendix C

Air Dispersion Modeling of Hexavalent Chromium Emissions from Automotive Body Repair Facilities

Prepared by: Tony Servin, P.E.,
Vlad Isakov, Ph.D.,
Planning and Technical Support Division,
California Air Resources Board,
California Environmental Protection Agency

Date: July 3, 2001

Summary

The air dispersion of hexavalent chromium (Cr^{+6}) emissions from four separate automotive body repair facilities are evaluated to estimate the downwind concentration of Cr^{+6} . In addition, the Cr^{+6} emissions from eight generic facilities are also evaluated for sensitivity purposes. The emissions are input into the Industrial Source Complex, Short Term 3 (ISCST3) air dispersion model to determine the maximum above ambient levels of Cr^{+6} . A summary of the results are shown in Table 1 below. As an example, the maximum above ambient annual average concentration due to emissions of Cr^{+6} from facility F1 is $1.1\text{e-}2 \mu\text{g}/\text{m}^3$ at a distance of 50 meters from the stack. A detailed description of the analysis and more modeling results including population burden and plots of concentration follow.

Table 1
Above Ambient Concentration of Cr^{+6} at Maximum Impacted
Receptor for Four Autobody Repair Facilities

Facility	Location	Max. Ann. Avg. Conc. Above Amb. ($\mu\text{g}/\text{m}^3$)	Distance to Maximum (meters)	Cr^{+6} Emissions (lbs/year)
F1	Stockton	1.1e-2	50	11
F2	Fresno	1.2e-3	78	1.5
F3	Stockton	8.3e-5	22	7.8e-3
F4	Stockton	1.3e-5	22	4.2e-3

Analysis

It has been requested to estimate the downwind concentration of hexavalent chromium (Cr^{+6}) emissions from four specific automotive body repair facilities and for several generic automotive body repair facilities. Cr^{+6} may be emitted during the auto body repair and painting process and therefore emissions are simulated through a stack when from a paint booth or as a volume source when emissions are in an open environment. The source conditions from the four specific facilities, as provided by the Stationary Source Division staff of the Air Resources Board, are shown in Table 2 below. The names of the facilities are replaced with neutral identifiers F1 through F4.

Table 2							
Facility Source Parameters							
Facility	Stack height (m)	Stack Diameter (m)	Stack Gas Temp. (K)	Stack Gas Velocity (m/sec)	Op. Sched.	Emiss. (g/s)	Emiss. (lb/yr)
F1	8.534	0.6096	294.1	22.64	M-F 8-12pm, 1-5pm	6.93e-04	11.4
F2	6.25	0.61	293	15.09	M-F 8-12pm, 1-5pm	9.00e-05	1.5
F3	1.828	0.762	295.22	10.34	M-F 8-12pm, 1-5pm	4.71e-07	7.8e-3
F4	3.96	0.6858	293	17.9	Mon-Sun 24 hr/dy	6.13e-08	4.2e-3
Notes: Building downwash simulated with a nominal building of 20 ft. by 20 ft. by 20 ft. high. UTM coordinates calculated by PTSD staff.							

The US-EPA ISCST3 (Version 00259) air dispersion model was utilized in this analysis to estimate above ambient downwind concentrations from emissions directly emitted from a source. ISCST3 is a regulatory Gaussian plume model. For this analysis, it is assumed that the Cr^{+6} emissions are inert and that particle deposition is negligible. An example ISCST3 input file that is used for facility F1 is shown in Appendix B.

Three different receptor networks were used for each of the facilities. The coarse grid covers a 30km modeling domain centered over the source with 1km grid cell spacing. The fine grid covers 3km modeling domain centered over the source with a 100m grid cell spacing. The very fine grid covers a 300m modeling domain centered over the source with a 10m grid cell spacing. The very fine grid is used to locate the maximum impacted receptor. The coarse grid is used to estimate the population burden with a census tract overlay. The fine grid is used to smooth the concentration gradient for receptors near the source in the coarse grid receptor field for the purpose of calculating the population burden.

The population burden is estimated by overlaying the 1990 census tract data over the course receptor grid. The census tracts are apportioned to the 1 km grid cells based on an area weighting of the census tract within a grid cell. Year 1990 census data are used in this analysis because year 2000 census data at the census tract level are not available at this time. The US Census Bureau estimates 2000 census tract data will be released sometime between June to September 2001.

Meteorological data from Stockton and Fresno are used for this simulation. Five years of hourly surface observations from Fresno for a period of 1960 – 1964 for source F2 and one year of 1976 data for Stockton for sources F1, F3, and F4 are input directly to the ISCST3 model. These data are the most recent preprocessed meteorological data that are readily available for use in the ISCST3 air dispersion model. Holzworth seasonal averages are used for the upper air data.

Results

Table 3 below shows the maximum above ambient annual average concentration of Cr^{+6} from the four facilities listed in Table 2. As an example, Table 3 shows the maximum above ambient annual average concentration of Cr^{+6} is $1.1\text{e-}2 \mu\text{g}/\text{m}^3$ due to emissions from facility F1 at a receptor located 50 meters from the source.

The concentration gradients near the facilities are shown in Figures 1 through Figure 4 in Appendix A. The estimated annual average concentration from emissions from facility F1 are shown in Figure 1 for the very fine grid receptor network (10m grid cell spacing). Figures 2, 3, and 4 show similar maps for facilities F2, F3, and F4, respectively. The center of Figures 1 through Figure 4 are null because the ISCST3 air dispersion model will not estimate concentrations for receptors that are within 1 meter of the footprint of the building dimensions used for the building downwash analysis. The building footprints are at the center of the plots.

Table 3 Maximum Above Ambient Annual Average Concentration, Cr^{+6}				
Facility	Conc. ($\mu\text{g}/\text{m}^3$)	X loc. (m)	Y loc. (m)	Dist. (m)
F1	1.1e-2	40	-30	50
F2	1.2e-3	60	-50	78
F3	8.3e-5	20	-10	22
F4	1.3e-5	20	-10	22

Table 4 below shows the population burden distribution for hexavalent chromium emitted from the four facilities F1 – F4. As an example, Table 4 shows that for facility F2, a minimum of 66 people, according to the 1990 census data, are exposed to a concentration of $1\text{e-}4 \mu\text{g/m}^3$ or greater and that a minimum of 120 people are exposed to a concentration of $2\text{e-}5 \mu\text{g/m}^3$ or greater.

Table 4

Population Distribution – Cr^{+6} Burden

Facility	F1	F2	F3	F4
Cr^{+6} Concentration ($\mu\text{g/m}^3$)	Cumulative Population (n)	Cumulative Population (n)	Cumulative Population (n)	Cumulative Population (n)
1e-2	Max	ne	ne	ne
1e-3	ne	Max	ne	ne
2e-4	3,200	ne	ne	ne
1e-4	6,000	66	ne	ne
5e-5	8,000	ne	Max	ne
2e-5	23,000	120	ne	ne
1e-5	28,000	520	ne	Max
5e-6	62,000	1,500	ne	ne
2e-6	180,000	5,100	ne	ne
1e-6	250,000	25,000	ne	ne
5e-7	310,000	87,000	ne	ne
2e-7	330,000	330,000	210	1,400
1e-7	ne	385,000	ne	ne
5e-8	ne	390,000	640	2,200
	ne	ne		14,000

In addition, a sensitivity analysis is performed for a generic autobody facility with various release conditions and a unit emission rate (i.e., $q = 1 \text{ g/s}$). The emission schedule is Monday thru Friday for 8 am – 12 pm and 1pm – 5pm (i.e., 2080 hrs/year and 8.25 tpy). The emission source may simulate a paint booth with a stack or open environment application with a volume source. Two different values for a stack height and exit velocity are used (i.e., $h = 7.6 \text{ m}$, 9.1 m and $v = 9.1 \text{ m/s}$, 22.9 m/s). Building downwash effects are included for a building that is 6.1 m high with a footprint of $6.1 \text{ m} \times 6.1 \text{ m}$. Five years (1960-1964) of hourly surface meteorological data for Oakland are arbitrarily selected for these simulations. The results of the sensitivity study are shown in Table 5 below.

As an example, assume fictitious facility A has an emission rate of 1.5 lb/yr and operates under the conditions specified for Table 5. The hourly emission rate would be calculated as $9.0\text{e-}5 \text{ g/s}$ (i.e., $9.0\text{e-}5 \text{ g/s} = 1.5 \text{ lb/yr} / 2080 \text{ hrs/yr} / 3600 \text{ s/hr} * 454 \text{ g/lb}$). The maximum concentration for facility A operating under conditions for Test 1 in Table 5 is calculated as $3.5\text{e-}3 \mu\text{g/m}^3$ (i.e., $3.5\text{e-}3 \mu\text{g/m}^3 = 9.0\text{e-}5 \text{ g/s} * 39.4 (\mu\text{g/m}^3) / (\text{g/s})$).

Table 5 Sensitivity Study for Generic Autobody Source Configurations			
Test #	Max. X/Q ($[\mu\text{g/m}^3]/[\text{g/s}]$)	Source-Receptor Distance (m)	Source Conditions
1	39.4	32	H=7.62m, Ex.vel.=9.14m/s, Stk.dia.=0.76m
2	21.5	41	H=7.62m, Ex.vel.=22.9m/s, Stk.dia.=0.61m
3	27.3	41	H=9.14m, Ex.vel.=9.14m/s, Stk.dia.=0.76m
4	15.7	52	H=9.14m, Ex.vel.=22.9m/s, Stk.dia.=0.61m
5	32.6	41	H=9.14m, Ex.vel.=0 Stk.dia.=0.61m
6	49.3	32	H=7.62m, Ex.vel.=0 Stk.dia.=0.61m
7	208.9	22	Volume src.: H=1.52m, Sy=0.71, Sz=0.71
8	212.2	22	Volume src.: H=1.52m, Sy=0.35, Sz=0.71

Appendix A

Figure 1 – Figure 4 Concentration Gradient of Estimated Cr⁺⁶ Concentrations from Facilities F1 – F4

Fig.1. Cr(VI) ann. avg. conc. ($\times 10^{-6}$ [$\mu\text{g}/\text{m}^3$]) from ISCST3, Source F1, Stockton

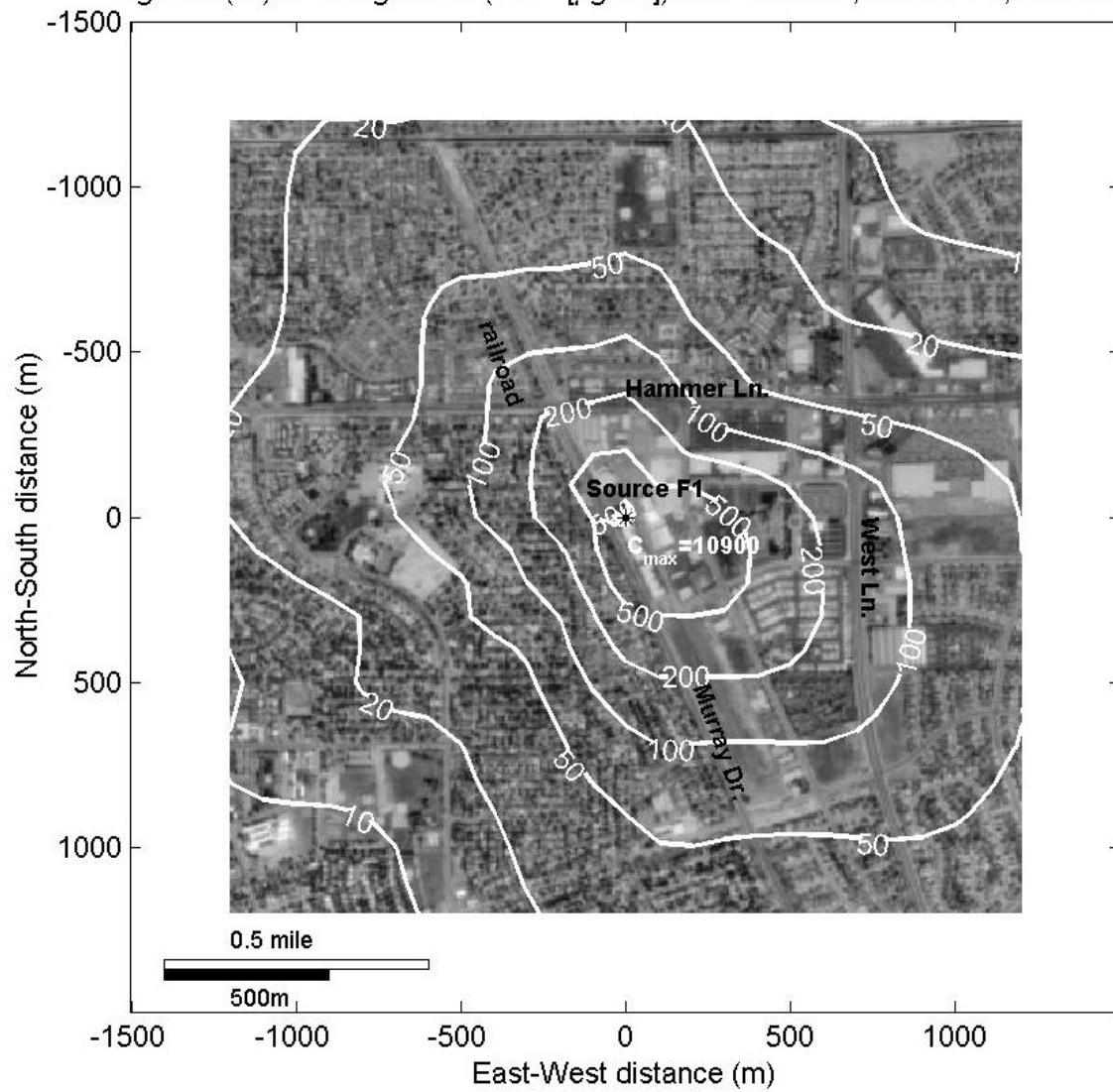


Fig.2. Cr(VI) ann. avg. conc. ($\times 10^{-6} [\mu\text{g}/\text{m}^3]$) from ISCST3, Source F2, Fresno

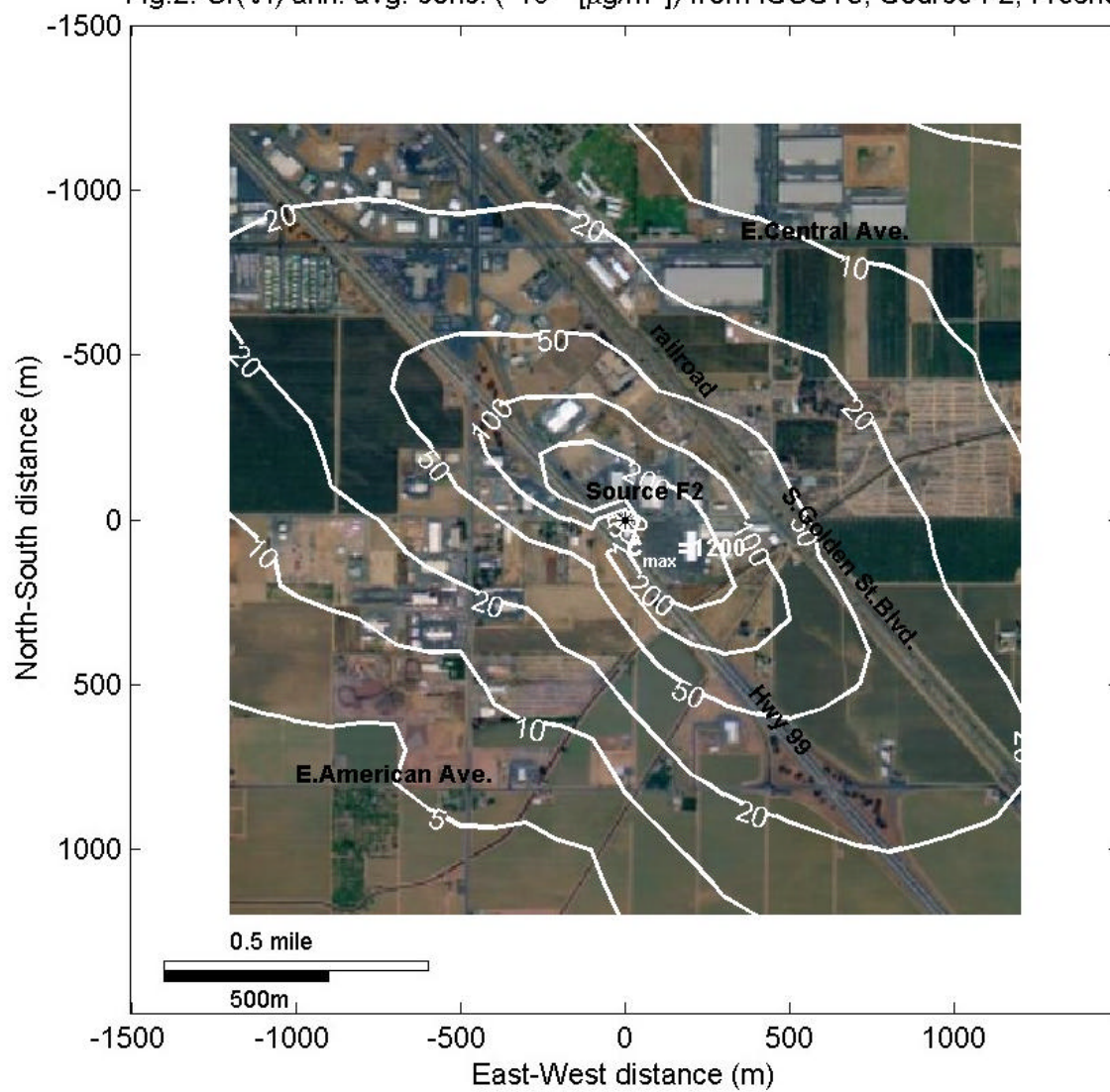


Fig.3. Cr(VI) ann. avg. conc. ($\times 10^{-6} [\mu\text{g}/\text{m}^3]$) from ISCST3, Source F3, Stockton

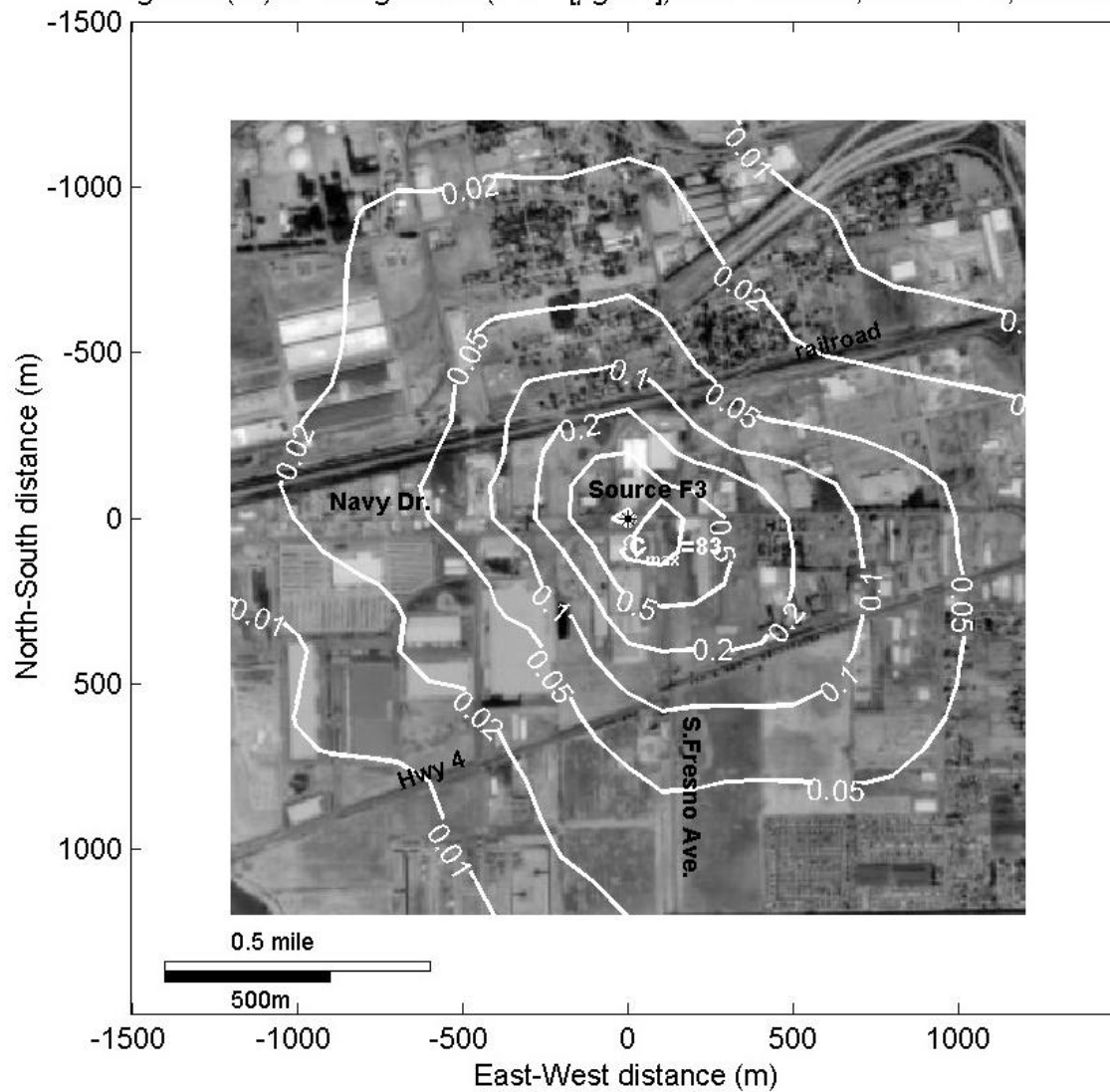
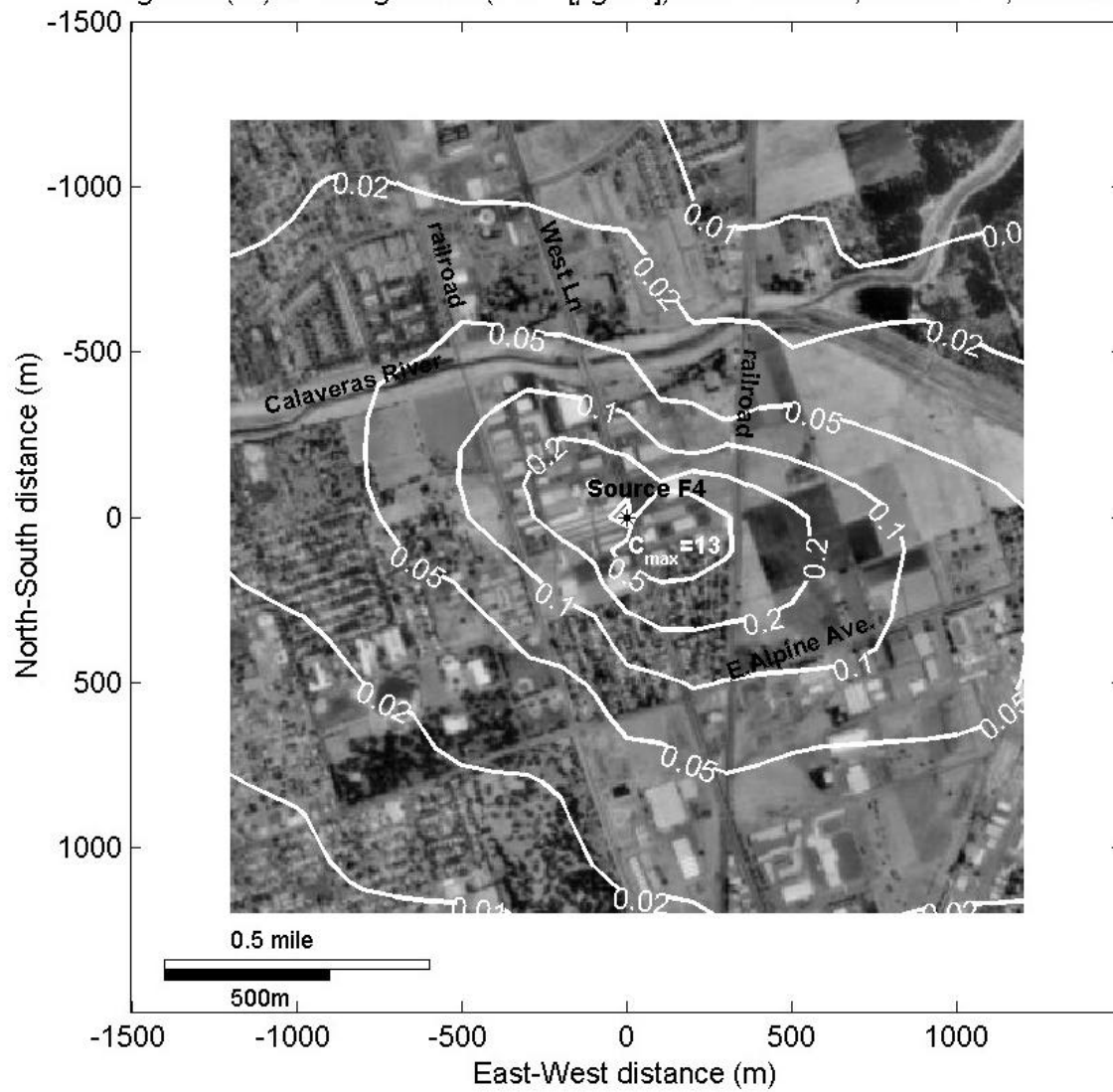


Fig.4. Cr(VI) ann. avg. conc. ($\times 10^{-6} [\mu\text{g}/\text{m}^3]$) from ISCST3, Source F4, Stockton



Appendix B

Example ISCST3 Input File

```
NO ECHO
** ISCST3 input file for Cr(VI) facility (F1)
** Vlad Isakov 06/01/2001

CO STARTING
  TITLEONE Source F1, Stockton
  TITLETWO one point source (URBAN)
  MODELOPT DFAULT URBAN CONC
** MODELOPT NOCALM RURAL CONC
  AVERTIME 1 PERIOD
  POLLUTID OTHER
** TERRHGTS ELEV
  RUNORNOT RUN
  ERRORFIL ERRORS.OUT
CO FINISHED

SO STARTING
** LOCATION Srcid Srctyp Xs Ys (Zs)
SO LOCATION STACK1 POINT 0.0 0.0 0.0

** Point Source QS HS TS VS DS
SO SRCPARAM STACK1 6.93E-04 8.534 294.1 22.64 0.6096
** EMISUNIT 1.0E6 GRAMS/SEC MICROGRAMS/M**3
** EMISUNIT 1.0E9 GRAMS/SEC NANOGRAMS/M**3
SO EMISUNIT 1.0E12 GRAMS/SEC picoGRAMS/M**3

SO BUILDHGT STACK1 6.1 6.1 6.1 6.1 6.1 6.1 6.1 6.1 6.1
SO BUILDHGT STACK1 6.1 6.1 6.1 6.1 6.1 6.1 6.1 6.1 6.1
SO BUILDHGT STACK1 6.1 6.1 6.1 6.1 6.1 6.1 6.1 6.1 6.1
SO BUILDHGT STACK1 6.1 6.1 6.1 6.1 6.1 6.1 6.1 6.1 6.1
SO BUILDWID STACK1 6.1 6.1 6.1 6.1 6.1 6.1 6.1 6.1 6.1
SO BUILDWID STACK1 6.1 6.1 6.1 6.1 6.1 6.1 6.1 6.1 6.1
SO BUILDWID STACK1 6.1 6.1 6.1 6.1 6.1 6.1 6.1 6.1 6.1
SO BUILDWID STACK1 6.1 6.1 6.1 6.1 6.1 6.1 6.1 6.1 6.1

** temporal prifiles - emissions by hour of day
** EMISFACT STACK1 HROFDY 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 1.0 1.0 1.0 1.0 1.0
** EMISFACT STACK1 HROFDY 1.0 1.0 1.0 1.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
** weekdays:
** weekdays (winter):
** EMISFACT STACK1 SHRDOWN 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
** EMISFACT STACK1 SHRDOWN 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
SO EMISFACT STACK1 SHRDOWN 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 1.0 1.0 1.0 1.0 0.0
SO EMISFACT STACK1 SHRDOWN 1.0 1.0 1.0 1.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
** weekdays (spring):
SO EMISFACT STACK1 SHRDOWN 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 1.0 1.0 1.0 1.0 0.0
SO EMISFACT STACK1 SHRDOWN 1.0 1.0 1.0 1.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
** weekdays (summer):
SO EMISFACT STACK1 SHRDOWN 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 1.0 1.0 1.0 1.0 0.0
SO EMISFACT STACK1 SHRDOWN 1.0 1.0 1.0 1.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
** weekdays (fall):
SO EMISFACT STACK1 SHRDOWN 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 1.0 1.0 1.0 1.0 0.0
SO EMISFACT STACK1 SHRDOWN 1.0 1.0 1.0 1.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
** saturdays:
SO EMISFACT STACK1 SHRDOWN 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
```

```

SO EMISFACT  STACK1  SHRDOW  0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
SO EMISFACT  STACK1  SHRDOW  0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
SO EMISFACT  STACK1  SHRDOW  0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
SO EMISFACT  STACK1  SHRDOW  0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
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SO EMISFACT  STACK1  SHRDOW  0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
SO EMISFACT  STACK1  SHRDOW  0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
** sundays:
SO EMISFACT  STACK1  SHRDOW  0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
SO EMISFACT  STACK1  SHRDOW  0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
SO EMISFACT  STACK1  SHRDOW  0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
SO EMISFACT  STACK1  SHRDOW  0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
SO EMISFACT  STACK1  SHRDOW  0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
SO EMISFACT  STACK1  SHRDOW  0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
SO EMISFACT  STACK1  SHRDOW  0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
SO EMISFACT  STACK1  SHRDOW  0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0

```

** Each source has a group ID for the x/q file.

```

SO SRCGROUP      1      STACK1
SO FINISHED

```

RE STARTING

```

GRIDCART GRIDEZ STA
**          XO      NX      DX      YO      NY      DY
**          -----
GRIDEZ XYINC -15000.0 31  1000.  -15000.0 31  1000.
** GRIDEZ XYINC  -1500.0 31   100.   -1500.0 31   100.
** GRIDEZ XYINC   -150.0 31    10.    -150.0 31    10.

```

GRIDCART GRIDEZ END

RE FINISHED

ME STARTING

```

INPUTFIL  stocktly.met
ANEMHGHT  10 METERS
SURFDATA  23237  1976  STOCKTON
UAIRDATA  23237  1976  STOCKTON
STARTEND  76 01 01 76 12 31

```

ME FINISHED

OU STARTING

OU MAXTABLE ALLAVE 10

** Write all x/q to same file, formatted.

```

POSTFILE PERIOD      1 PLOT fl_1000m.isc 31
** POSTFILE PERIOD      1 PLOT fl_100m.isc 31
** POSTFILE PERIOD      1 PLOT fl_10m.isc 31

```

OU FINISHED

Appendix D

Summary of Potential Risk Calculation Methodology

Appendix D

Summary of Potential Risk Calculation Methodology

This appendix describes the methodology used to calculate the potential cancer risk from the use of chromated coatings in auto body shops. We used generic facility air dispersion modeling to estimate the volume of ready-to-spray chromated coating that a facility would have to use to result in a given level of potential cancer risk. In performing this analysis, we made several assumptions based on the 2001 survey and facility parameters.

1. Facilities 1 through 6

The emissions from facilities 1-6 were modeled as stack emissions. Such facilities are representative of operations where the coatings are applied in a spray booth. We assumed color coats are the primary type of coating used in these facilities because color coats are typically applied in spray booths. We also assumed that, on average, 30 percent of the ready-to-spray (RTS) color coat is tint. Further, we assumed that 50 percent of the tint contains hexavalent chromium.

Based on the 2001 survey results, we estimated the sales-weighted average concentration of hexavalent chromium in tints to be 0.4 pounds per gallon. In order to calculate the annual throughput of chromated coatings, we assumed each facility operates 40 hours per week. We also used a fall out fraction (FOF) of 80 percent, and a control efficiency (CE) of 95 percent for the spray booth filter, based on the CAPCOA risk assessment guidelines for auto body shops. Below are example calculations based on 1 cancer case per million risk. The calculations were repeated for risk levels of 10 cancer cases per million and 100 cancer cases per million. Table D-1 presents the results.

Example Calculation:

Step 1: Calculate the emission rate based on the number of cancers per million.

$$\text{Emission Rate} = \frac{(\text{Cancer Risk})}{(\text{Unit Risk Factor for Cr}^{6+}) \times (\text{Max X/Q})}$$

The Maximum X/Q was obtained from air dispersion modeling results presented in Appendix C.

$$\text{Emission Rate} = \frac{1.0 \times 10^{-6}}{1.5 \times 10^{-1} (\text{F g/m}^3) \cdot 39.4 (\text{F g/m}^3)/(\text{g/s})} = 1.69 \times 10^{-7} \text{ g/s}$$

Step 2: Calculate the content of hexavalent chromium in the ready-to-spray color coat.

$$\begin{aligned} & \frac{.30 \text{ lbs. (total tint)}}{1 \text{ lbs. (RTS)}} \times \frac{.50 \text{ lbs. (chromated tint)}}{1 \text{ lbs (total tint)}} \times \frac{0.42454 \text{ lbs. (Cr}^{6+})}{1 \text{ gallon (chromated tint)}} \\ & \times \frac{1000 \text{ g}}{2.2046 \text{ lbs.}} = \frac{28.89 \text{ g (Cr}^{6+})}{\text{gallon (RTS)}} \end{aligned}$$

Step 3: Calculate the annual throughput of chromated RTS color coat.

$$\begin{aligned} \text{Volume (RTS)} &= \frac{\left[\text{Emission Rate} \right]}{\left[\frac{\text{Cr}^{6+} \text{ content}}{\text{gallon (RTS)}} \right] \times (1-\text{FOF}) \times (1-\text{CE})} \\ &= \frac{1.69 \times 10^{-7} \text{ g/s (Cr}^{6+})}{28.89 \text{ g (Cr}^{6+})/\text{gal (RTS)} \times (1-0.80) \times (1-0.95)} \times \frac{3600 \text{ s}}{1 \text{ hr}} \times \frac{40 \text{ hr}}{1 \text{ week}} \times \frac{52 \text{ weeks}}{1 \text{ year}} \\ &= 4.38 \text{ gal (RTS) /year} \end{aligned}$$

2. Facilities 7 and 8

Emissions from these facilities were modeled as fugitive emissions. Fugitive emissions occur when chromated coatings are applied outside of a spray booth. Because primers are typically applied outside of a spray booth, we assumed primers are the main coatings used under these conditions. We estimated the sales-weighted average content of hexavalent chromium in primers based on the 2001 survey results. The survey results indicate that the sales-weighted average content of hexavalent chromium in primers is 0.026 pounds per gallon. Since most of the reported primers are diluted prior to application, we estimated the sales-weighted average diluent to primer ratio based on the 2001 survey responses. A diluent to primer ratio of 0.60 was used to calculate the dilution factor and estimate the volume of ready-to-spray primer used. The transfer efficiency (TE) for a high-volume low-pressure spray gun was assumed

to be 65 percent, as recommended by the CAPCOA risk assessment guidelines. We used the same calculation methodology as in the example above to estimate the potential cancer risk from fugitive emissions. Table D-1 shows the volumes of coating use required by each facility to have a resulting risk of 1, 10 and 100 excess cancers per million, respectively.

Table D-1. Potential Cancer Risks Based on the Volume of Coating Used

Generic Facility	Max X/Q ([ug/m³]/[g/s])	1 cancer/million		10 cancers/million		100 cancers/million	
		Emission rate (g/s)	Volume of coating used (gal/year)	Emission rate (g/s)	Volume of coating used (gal/year)	Emission rate (g/s)	Volume of coating used (gal/year)
1	39.4	1.69E-07	4.4	1.69E-06	43.9	1.69E-05	438.6
2	21.5	3.10E-07	8.0	3.10E-06	80.4	3.10E-05	803.8
3	27.3	2.44E-07	6.3	2.44E-06	63.3	2.44E-05	633.1
4	15.7	4.25E-07	11.0	4.25E-06	110.1	4.25E-05	1100.8
5	32.6	2.04E-07	5.3	2.04E-06	53.0	2.04E-05	530.1
6	49.3	1.35E-07	3.5	1.35E-06	35.1	1.35E-05	350.6
7	208.9	3.19E-08	0.1	3.19E-07	0.9	3.19E-06	9.2
8	212.2	3.14E-08	0.1	3.14E-07	0.9	3.14E-06	9.0

Assumptions:

- 30% of ready-to-spray color coat is tint
- 50% of total tint contains Cr (VI)
- 1 gal of chromated tint contains 0.4 lbs of Cr (VI) based on the sales wt. average Cr (VI) in tints
- 40 working hours per week; 52 weeks per year
- tests 1-6 are stack emissions from the use of color coats
- tests 7-8 are fugitive emissions from the use of primers
- sales wt. average diluent/primer ratio is 0.6 g.
- 1 gal of primer contains 0.026 lbs of Cr (VI) based on the sales wt. average Cr(VI) in primers

Appendix E

Summary of Cost Analysis Methodologies

Appendix E

Summary of Cost Analysis Methodologies

This appendix describes the methods used to calculate the cost differential between chromated coatings and non-chromated or alternative coatings, and the total cost of the proposed regulation. Information was obtained from responses to the 2001 *Survey of Motor Vehicle and Mobile Equipment Refinishing Coatings Containing Hexavalent Chromium or Cadmium and their Alternatives* (2001 Survey). Since none of the manufacturers surveyed reported any cadmium use in these coatings, cadmium is not included in this discussion.

We used two methods to estimate the total cost of the proposed ATCM. First, we estimated the total cost by considering the differences in raw material costs for chromated vs. non-chromated coatings reported in the 2001 survey. We also estimated the total cost based on the retail price differences for these coatings, as reported in the 2001 survey. Staff also determined the maximum cost to individual consumers having their vehicles refinished.

Annual costs include annualized non-recurring fixed costs (e.g., research and development, product and consumer testing, equipment purchases, modifications, etc.) and annual recurring costs (e.g., raw materials, labeling, packaging, etc.). Staff assumed fixed costs to be zero, because all but one very small manufacturer responding to the survey already produce non-chromated coatings. Thus, these manufacturers are not expected to incur any reformulation costs and will not be required to purchase new production line equipment. Because some manufacturers did not respond to the 2001 survey, staff adjusted the survey results to reflect complete market share.

Staff consulted with the automotive refinishing industry to determine representative averages for the various uses of chromated coatings on motor vehicles and mobile equipment (e.g., percent primer use vs. percent topcoat use for a typical paint job). Staff used the upper end of the averages provided by industry to perform a worst-case analysis of the cost of the regulation.

A. Estimated Total Cost of the Proposed Regulation

Staff estimated the total cost of the proposed regulation based on estimates of the raw material costs for typical formulations of primers, packaged colors, and tints. The typical formulations were determined based on information reported in the 2001 survey. Distributor-level ingredient prices from Chemical Market Reporter or from discussions with industry representatives were used to calculate the raw material costs for chromated vs. non-chromated coatings. Based on a review of the 2001 survey information, staff subdivided the primers and tints into subsets of similar and dissimilar formulations. The typical

chromated formulation of each subgroup was compared against its direct alternative formulation. Staff then multiplied the number of gallons of chromated products sold in 2000 within each group by the raw material cost differential. Chromated products that were not reported to have a direct alternative were included in the dissimilar formulation group (which had the higher cost differential). These costs were then added together and adjusted to reflect the complete market share. Using this methodology, the total cost of the regulation is estimated to be about \$440,000 per year for five years.

To perform a worst-case analysis, we estimated the total cost of the regulation using the retail price information provided in the 2001 survey. Based on the 2001 survey results, the retail price of coatings can vary significantly. To estimate the total cost of the regulation, staff estimated the average price per gallon for each group of coatings (tints, packaged colors, and primers) reported in the 2001 survey. The difference between the cost for chromated and alternative coatings was determined for each group. The price difference for each group was then multiplied by the total gallons of coatings containing hexavalent chromium in that group. The total cost of the regulation was then estimated by summing the retail price differential for each group of coatings. Based on this analysis, the annual cost of the proposed regulation is estimated to be about \$2 million per year for five years.

B. Estimated Cost to Consumers

In estimating the cost to the consumer, we used the retail price reported in the 2001 survey. The coatings were divided into three groups: tints, packaged colors and primers. The average percentage price increases for non-chromated tints, packaged colors, and primers were determined from the responses to the 2001 survey. A direct comparison was made between coatings containing hexavalent chromium and their alternatives.

Staff used the survey results to calculate the sales-weighted average retail prices for chromated and non-chromated coatings. The sales-weighted average retail prices for chromated and non-chromated primers are estimated to be \$76.66 and \$78.04 per gallon, respectively. The sales-weighted average retail prices for chromated and non-chromated tints are estimated to be \$102.76 and \$233.14 per gallon, respectively.

The percentage price increase for each group of coatings was calculated separately. The equation for calculating the percent increase is shown below. The staff assumed equal volumes of coating use for the chromated and alternative coatings.

$$price\ increase(\%) = \frac{(\sum V_A * P_A) - (\sum V_H * P_H)}{\sum V_H * P_H} * 100$$

where,

- V_A = the volume of each coating containing hexavalent chromium that is directly linked to the alternative coating (gal)
- P_A = the price of each alternative coating (\$/gal)
- V_H = the volume of each coating containing hexavalent chromium (gal)
- P_H = the price of each coating containing hexavalent chromium (\$/gal)

Using this equation, the price increase for the alternative primers is 1.2 percent (\$0.92 per gallon). The price increase for the alternative tints is 192 percent (\$197.77 per gallon). However, the total price increase of the tints is not directly passed on to the customer. This is the case, because the cost for color coats is based on an average of the costs of the materials used in the "ready to spray" coating, which can include catalysts, reducers, binders, hardeners, and activators in addition to the tints. Almost all color coatings contain a combination of various tints. For example, a commonly used white coating is comprised of black, yellow, blue, and white tints.

Based on discussions with industry representatives, we assumed that typically, 30 percent of a "ready to spray" color coating is tint. ARB staff assumed that 20 percent of color coats contain a chromated tint. Staff made a conservative assumption that, on average, 50 percent of the tint in a color coating containing chromated tint, is a chromated tint. Based on this assumption, the average price increase for a chromated "ready to spray" color coating is 5.8% (\$5.93 per gallon).

The total cost of coating materials for a vehicle is subdivided as follows:

- 40 percent of the total cost is attributed to the clear coats (clear coats don't contain hexavalent chromium);
- 25 percent of the total cost is attributed to the color coats; and
- 35 percent of the total cost is attributed to the primers.

For each coating type, the percent price increase was multiplied by the fraction that type of coating contributes to the total coatings cost; the individual fractions were summed to provide the average cost increase of coating materials ($0.4 * 0\% + 0.25 * 5.8\% + 0.35 * 1.2\%$). Therefore, the average increase for the various coating materials used is 1.9% (\$1.80 per gallon).

ARB estimates that only 20 percent of the cost of coating a vehicle is due to the coating materials. The remaining 80 percent of the cost is for labor. As such, the price increase for coating a vehicle with non-chromated coatings is 0.4% ($1.9\% \times 0.2$). The cost of painting an entire vehicle is approximately \$3,000. Therefore, the price increase in a worst-case scenario of painting an entire vehicle would be about \$12.

Staff believes that most individuals do not choose to repaint their vehicle annually. Thus, the majority of individuals will incur an increase in cost less than the estimated \$12 because most repair jobs do not involve repainting an entire vehicle.